

AMENDMENTS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A signal processing apparatus which changes a magnification ratio of an image acquired by image sensing means, comprising:

first signal processing means for executing ~~a~~ first signal processing for reducing a number of pixels to be recorded ~~to a number lower than a number of~~ ~~than that of the~~ acquired pixels when the magnification ratio of the image is to be increased;

second signal processing means for executing ~~a~~ second signal processing for increasing a number of pixels to be recorded ~~to a number greater than a number of~~ ~~than~~ ~~that of the~~ acquired pixels when the magnification ratio of the image is to be increased;

optical zoom controlling means for controlling lens optical system when the magnification ratio of the image is to be ~~increased~~ changed;

first detection means for detecting selection of one of a telephoto side and a wide angle side using a zoom key;

second detection means for detecting a limit of an increase in magnification ratio of the image by the first signal processing and a predetermined maximum magnification ratio of the image by the second signal processing; [[and]]

display means for displaying a magnification ratio indicator indicating a current magnification ratio on a scale indicating an available minimum magnification ratio at a first end and an available maximum magnification ratio at a second end such that the indicator moves on the scale between the minimum magnification ratio and the maximum magnification ratio in accordance with changes in the magnification ratio of the image;
and

selection means for selecting one of a first mode and a second mode;

wherein when the first mode is selected by said selection means, and said first detection means detects that the telephoto side is continuously selected after transition from a control of the lens system by said optical zoom controlling means to the first signal processing, the first signal processing is executed, and when said second detection means detects that the increase in magnification ratio of the image by the first signal processing has reached the limit, the second signal processing is subsequently executed, and if said second detection means detects that the second signal processing the magnification ratio has reached the predetermined maximum magnification ratio of the image, the second signal processing is inhibited, [[and]]

when the second mode is selected by said selection means, the first signal processing is executed until~~even when~~ said second detection means detects that the increase in magnification ratio of the image by the first signal processing has reached the limit, and the second signal processing is inhibited even if said first detection means [[then]] detects that the telephoto side is continuously selected ~~after transition from a control of the lens system by said optical zoom controlling means to the first signal processing, the second signal processing is inhibited, and~~

wherein said display means changes the maximum magnification ratio indicated by the second end of the scale in accordance with the selection of one of the first mode and the second mode and further displays on the scale a magnification range in which the second signal processing is applied if the first mode is selected.

2. (Original) The apparatus according to claim 1, wherein said first signal processing means further comprises spatial low pass filter means for limiting a spatial frequency band of the image.
3. (Previously Presented) The apparatus according to claim 2, wherein said spatial low pass filter means changes a frequency characteristic of the spatial frequency band limit in accordance with a variable magnification ratio.

4. (Previously Presented) The apparatus according to claim 1, wherein said second signal processing means further comprises edge enhancement means for enhancing an edge of an image.
5. (Original) The apparatus according to claim 4, wherein said edge enhancement means changes degree of enhancement of the edge in accordance with a variable magnification ratio of said second signal processing means.
6. (Original) The apparatus according to claim 5, wherein in the first mode and the second mode, when the variable magnification ratio of the image acquired by the image sensing means is $\times 1$, the first signal processing and the second signal processing are not executed.
7. (Original) The apparatus according to claim 1, wherein the signal of the image is enlarged by the second signal processing.
8. (Original) A signal storage apparatus comprising signal storage means for storing a signal of an image,

wherein the signal of the image processed by a signal processing apparatus of claim 1 is stored in said signal storage means.
9. (Original) An image recording apparatus comprising

a signal processing apparatus of claim 1; and

optical variable magnification means for changing a view angle of an object image formed on a light receiving surface of image sensing means,

wherein variable magnification by said optical variable magnification means is executed in first signal processing.

10. (Withdrawn) An image data generation apparatus which generates image data on the basis of image sensing data photographed by an image sensing element, comprising:

recording mode control means for controlling a first recording mode in which image data in a first image format having a first image size corresponding to the number of pixels of the image sensing element is generated and recorded, and a second recording mode in which image data in a second image format having a second image size smaller than the first image size is generated and recorded;

electronic variable magnification means for executing electronic variable magnification processing in generating the image data in the second image format in the second recording mode;

maximum variable magnification ratio setting means for setting a maximum variable magnification ratio in said electronic variable magnification means; and

variable magnification ratio change indication means for indicating a change in variable magnification ratio while defining, as a maximum value, the maximum variable magnification ratio set by said maximum variable magnification ratio setting means,

wherein said maximum variable magnification ratio setting means sets, as the maximum variable magnification ratio, a maximum variable magnification ratio candidate selected by a user from a plurality of types of maximum variable magnification ratio candidates, and said variable magnification ratio change indication means indicates, as a boundary line, a value of a maximum variable magnification ratio candidate whose variable magnification ratio is lower than that of the maximum variable magnification ratio.

11. (Currently Amended) A signal processing method of changing a magnification ratio of an image acquired by image sensing means, comprising:

a first signal processing step of executing a first signal processing for reducing a number of pixels to be recorded to a number lower than a number of acquired pixels ~~an~~

image sensing signal with respect to a scanning range of an obtained image sensing surface when the magnification ratio of the image is to be increased;

an optical zoom controlling step of controlling a lens optical system when the magnification ratio of the image is to be increased changed;

a second signal processing step of executing second signal processing a second signal processing for increasing a number of pixels to be recorded to a number greater than a number of acquired pixels when different from the first signal processing step to change the magnification ratio of the image is to be increased;

a first detection step of detecting selection of one of a telephoto side and a wide angle side using a zoom key;

a second detection step of detecting a limit of an increase in magnification ratio of the image by the first signal processing step and a predetermined maximum magnification ratio of the image by the second signal processing; [[and]]

a displaying step of displaying a magnification ratio indicator indicating a current magnification ratio on a scale indicating an available minimum magnification ratio at a first end and an available maximum magnification ratio at a second end such that the indicator moves on the scale between the minimum magnification ratio and the maximum magnification ratio in accordance with changes in the magnification ratio of the image; and

a selection step of selecting one of a first mode and a second mode;

wherein in the selection step,

when the first mode is selected, and it is detected in the first detection step that the telephoto side is continuously selected after transition from a control of the lens system by said optical zoom controlling step to the first signal processing, the first signal processing is executed, and when it is detected in the second detection step that the increase in magnification ratio of the image by the first signal processing has reached the limit, the second signal processing is subsequently executed, and if said second detection means detects that the second signal processing magnification ratio has reached the

predetermined maximum magnification ratio of the image, the second signal processing is inhibited, [[and]]

when the second mode is selected, the first signal processing is executed until even when it is detected in the second detection step detects that the increase in magnification ratio of the image by the first signal processing has reached the limit, and the second signal processing is inhibited even if it is then detected in the first detection step detects that movement from the wide angle side to the telephoto side is continuously selected after transition from a control of the lens system by said optical zoom controlling step to the first signal processing, the second signal processing is inhibited, and

wherein said display step changes the maximum magnification ratio indicated by the second end of the scale in accordance with the selection of one of the first mode and the second mode and further displays on the scale a magnification range in which the second signal processing is applied if the first mode is selected.

12. (Withdrawn) An image data generation method for generating image data on the basis of image sensing data photographed by an image sensing element, comprising:

a recording mode control step of controlling a first recording mode in which image data in a first image format having a first image size corresponding to the number of pixels of the image sensing element is generated and recorded, and a second recording mode in which image data in a second image format having a second image size smaller than the first image size is generated and recorded;

an electronic variable magnification step of executing electronic variable magnification processing in generating the image data in the second image format in the second recording mode;

a maximum variable magnification ratio setting step of setting a maximum variable magnification ratio in the electronic variable magnification step; and

a variable magnification ratio change indication step of indicating a change in variable magnification ratio while defining, as a maximum value, the maximum variable magnification ratio set in the maximum variable magnification ratio setting step,

wherein in the maximum variable magnification ratio setting step, a maximum variable magnification ratio candidate selected by a user from a plurality of types of maximum variable magnification ratio candidates is set as the maximum variable magnification ratio, and in the variable magnification ratio change indication step, a value of a maximum variable magnification ratio candidate whose variable magnification ratio is lower than that of the maximum variable magnification ratio is indicated as a boundary line.

13. (Currently Amended) A computer readable medium storing a program which when executed by a computer performs a method for a signal processing apparatus which changes a magnification ratio of an image acquired by image sensing means, the method comprising:

a first signal processing step of executing a first signal processing for reducing a number of pixels to be recorded to a number lower than a number of ~~than that of the~~ acquired pixels when the magnification ratio of the image is to be increased;

a second signal processing step of executing a second signal processing for increasing a number of pixels to be recorded to a number greater than a number of ~~than~~ that of the acquired pixels when the magnification ratio of the image is to be increased;

an optical zoom controlling step of controlling a lens optical system when the magnification ratio of the image is to be ~~increased~~ changed;

a first detection step of detecting selection of one of a telephoto side and a wide angle side using a zoom key;

a second detection step of detecting a limit of an increase in magnification ratio of the image by the first signal processing step and a predetermined maximum magnification ratio of the image by the second signal processing; [[and]]

a displaying step of displaying a magnification ratio indicator indicating a current magnification ratio on a scale indicating an available minimum magnification ratio at a first end and an available maximum magnification ratio at a second end such that the indicator moves on the scale between the minimum magnification ratio and a maximum magnification ratio in accordance with changes in the magnification ratio of the image; and

a selection step of selecting one of a first mode and a second mode;

wherein the signal processing apparatus is caused to, in the selection step,

when the first mode is selected, and it is detected in the first detection step that the telephoto side is continuously selected after transition from a control of the lens by said optical zoom controlling step to the first signal processing, execute the first signal processing, and when it is detected in the second detection step that the increase in magnification ratio of the image by the first signal processing has reached the limit, subsequently execute the second signal processing to enlarge the image, and if said second detection means detects that the second signal processing magnification ratio has reached the predetermined maximum magnification ratio of the image, the second signal processing is inhibited, [[and]]

when the second mode is selected, the first signal processing is executed until even when it is detected in the second detection step detects that the increase in magnification ratio of the image by the first signal processing has reached the limit, and the second signal processing is inhibited even if it is then detected in the first detection step detects that movement from the wide angle side to the telephoto side is continuously selected after transition from a control of the lens system by said optical zoom controlling means to the first signal processing, inhibit the second signal processing, and

wherein said display step changes the maximum magnification ratio indicated by the second end of the scale in accordance with the selection of one of the first mode and the second mode and further displays on the scale a magnification range in which the second signal processing is applied if the first mode is selected.

14. (Withdrawn) A program for an image data generation apparatus which generates image data on the basis of image sensing data photographed by an image sensing element, comprising:

a recording mode control step of controlling a first recording mode in which image data in a first image format having a first image size corresponding to the number of pixels of the image sensing element is generated and recorded, and a second recording mode in which image data in a second image format having a second image size smaller than the first image size is generated and recorded;

an electronic variable magnification step of executing electronic variable magnification processing in generating the image data in the second image format in the second recording mode;

a maximum variable magnification ratio setting step of setting a maximum variable magnification ratio in the electronic variable magnification step; and

a variable magnification ratio change indication step of indicating a change in variable magnification ratio while defining, as a maximum value, the maximum variable magnification ratio set in the maximum variable magnification ratio setting step,

wherein the image data generation apparatus is caused to, in the maximum variable magnification ratio setting step, setting, as the maximum variable magnification ratio, a maximum variable magnification ratio candidate selected by a user from a plurality of types of maximum variable magnification ratio candidates, and in the variable magnification ratio change indication step, indicating, as a boundary line, a value of a maximum variable magnification ratio candidate whose variable magnification ratio is lower than that of the maximum variable magnification ratio.

15. (Cancelled).

16. (New) A signal processing apparatus which changes a magnification ratio of an image acquired by an image sensing element, the apparatus comprising:

a first signal processing unit which executes a first signal processing that increases the magnification ratio of the image by reducing a number of pixels to be recorded to a number lower than a number of pixels acquired by the image sensing element;

a second signal processing unit which executes a second signal processing that increases the magnification ratio of the image by increasing a number of pixels to be recorded to a number greater than a number of pixels acquired by the image sensing element;

an optical zoom control unit that controls a lens optical system when the magnification ratio of the image is to be changed;

a first detection unit that detects selection of one of a telephoto side and a wide angle side using a zoom key;

a second detection unit that detects a limit of an increase in magnification ratio of the image by the first signal processing and a predetermined maximum magnification ratio of the image by the second signal processing;

a display unit for displaying a magnification ratio indicator indicating a current magnification ratio on a scale indicating an available minimum magnification ratio at a first end and an available maximum magnification ratio at a second end such that the indicator moves on the scale between the minimum magnification ratio and the maximum magnification ratio in accordance with changes in the magnification ratio of the image; and

a selection unit for selecting one of a first mode and a second mode;

wherein when the first mode is selected by said selection unit, and said first detection unit detects that the telephoto side is continuously selected after transition from a control of the lens system by said optical zoom control unit to the first signal processing, the first signal processing is executed, and when said second detection unit detects that the increase in magnification ratio of the image by the first signal processing has reached the limit, the second signal processing is subsequently executed, and if said second detection unit detects that the second signal processing has reached the

predetermined maximum magnification ratio of the image, the second signal processing is inhibited,

when the second mode is selected by said selection unit, the first signal processing is executed until said second detection unit detects that the increase in magnification ratio of the image by the first signal processing has reached the limit, and the second signal processing is inhibited even if said first detection unit detects that the telephoto side is continuously selected, and

wherein said display unit changes the maximum magnification ratio indicated by the second end of the scale in accordance with the selection of one of the first mode and the second mode and further displays on the scale a magnification range in which the second signal processing is applied if the first mode is selected.